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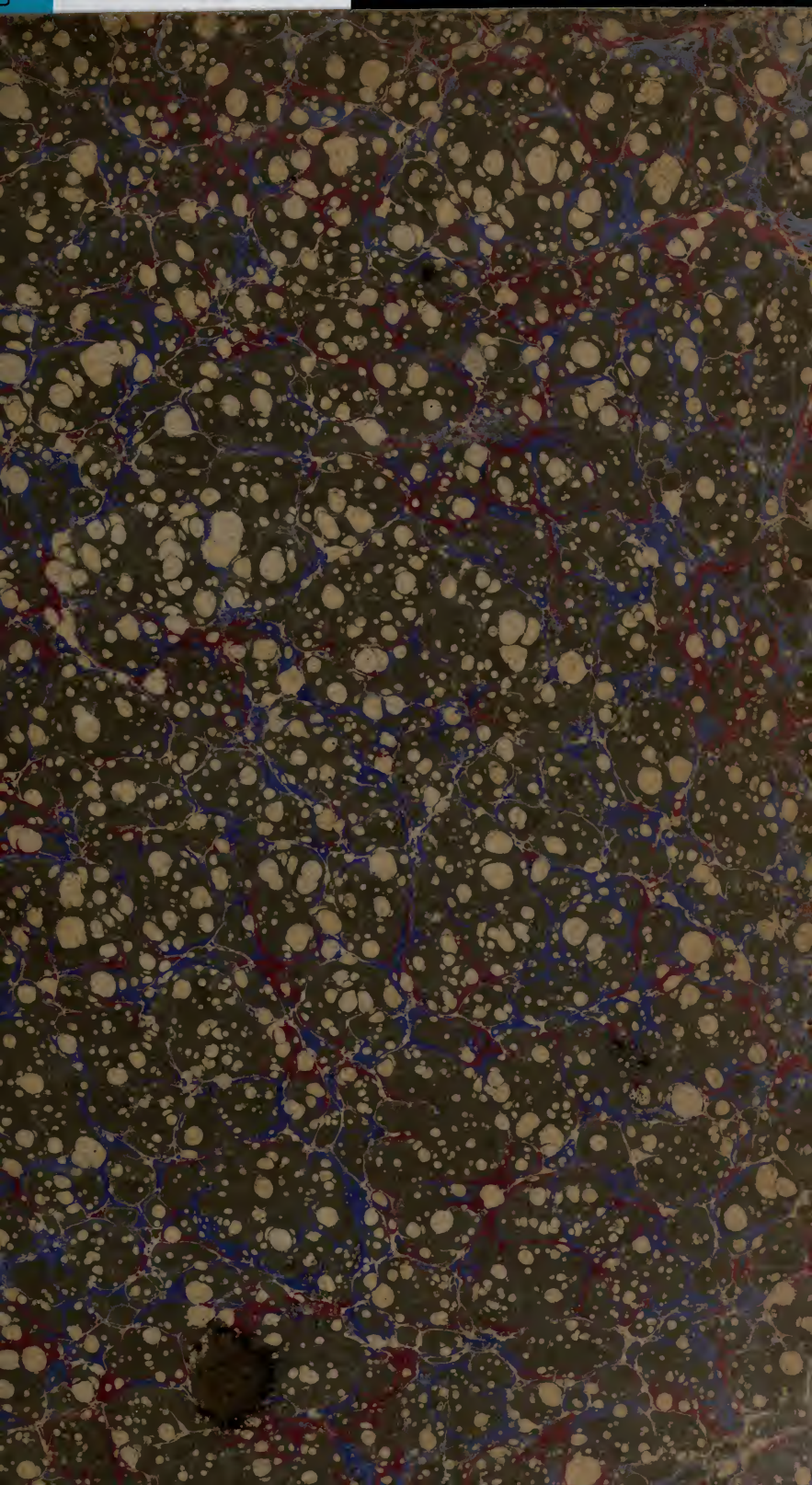

46TH CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { REPORT No. 203.

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METRIC COINAGE.

U.S. Congress

FEBRUARY 12, 1880.—Committed to the Committee of the Whole House on the state of the Union and ordered to be printed.

Mr. STEPHENS, from the Committee on Coinage, Weights, and Measures, submitted the following

REPORT:

[To accompany bills H. R. 410, 411, 412, 1519, 1911.]

The Committee on Coinage, Weights, and Measures, to whom were referred House bills Nos. 410, 411, 412, 1519, *and* 1911, *on the subject of the metric system of coinage, in relation to the alloy coin metal of gold and silver with copper, in certain proportions and manufacture, and its embodiment of the metric unit of weight in dollars of United States standard value, and the multiples and fractional parts of a dollar, all as bi-metallic money, under one monometallic system of coinage, have considered the subject, and beg leave respectfully to report:*

In preparing this report the draughtsman has availed himself liberally of several parts of reports on kindred subjects, previously made by him to the House of Representatives from the same committee of the last Congress, which will appear in their proper places without special note.

It has been heretofore set forth and now repeated substantially, that the metric system of weights, and the troy system, are the only two now used in coinage. The metric unit or meter is derived from the measurement of the earth's surface, and the gram or unit of weight, from its cube of water. The troy system is derived from the length and vibration of a pendulum, and in like manner the unit of weight or pound, from water. But the metric is a decimal series of proportions entirely, and avoids the use of the interminable or vulgar fractions, such as thirds, chiefly. Hence its almost universal adoption. Fourths and halves are equivalent of .25 and .50, and admissible in metric measurement, either of length or of weight. The metric and troy weights are not interconvertible, except at remote points apparently governed by the natural laws from which they are derived, and most of the European nations have abandoned the troy and adopted the metric system; hence, in foreign calculations in commercial transactions in our gold coin and silver coin, in estimating an equivalent conversion of value, there is always an interminable remainder of value in our coin which usually, beyond two decimal points, would be entirely lost, amounting in large transactions to a considerable sum, because their values are computed in grams, and our present coin is computed and made by us in troy grains, and the latter are not convertible on even measure. The loss on American double-eagles in some cases, according to respectable information received, is as high as 1.65 per centum.

Thus our gold double-eagle contains 516 grains, nine-tenths fine, or 464.4 grains of pure gold, while it takes 15.432349 grains to make one

gram. The result is that our gold double-eagle contains 30.09262204+ grams of pure gold, presenting interminable remainders beyond two decimal points, the precious metal of which is practically lost in our coin in counting computations.

The silver dollar of 412.5 grains, nine-tenths fine, presents the same and still another practical difficulty. It contains 371.25 grains of pure silver. In all coin calculations the copper is counted of no value; it is a metallurgical necessity. The ratio of value in the silver dollar of 412.5 grains, which is the 371.25 grains, must be computed as to the gold in our 25.8-grain dollar, which is 23.22 grains of pure gold, and it presents an interminable ratio of 15.9883720930232+, which, in fact, is no practical ratio whatever for any available purposes of commercial calculation. It is commonly stated as a ratio of 15.98, but such is not the metallurgical fact. It is interminable, and in any conversion, either into gold value or into metric measure, would result in constant loss to the holder of the silver coin; 412.8 grains would have been an even ratio of 16 to 1, and the mint tolerance of 1.5 grains allowed by law, practically makes its maximum weight 414 grains troy, which exceeds the ratio of 16 to 1 by a tolerance of 1.2 grains. The silver dollar of 412.5 grains presents the same difficulty of conversion in commercial calculations into values in metric measure as the gold dollar or gold coin does. Expressed in grams, it would be 26.72956657+; being interminable and beyond the two decimal points, would result in the loss of much of its real value, equal to 35.33 cents in a thousand dollars on counting computations.

On the other hand, to make our present gold coin alloy metric, would reduce its intrinsic value $3.078227531+ in a thousand dollars, would unsettle all contracts and measures of value sounding in dollars, and would make the fractions of a half-eagle so small as to be undesirable for general use, and liable to be mistaken in the absence of light for the color of the new copper cents and two-cent pieces, as the copper alloy in them tarnishes by use, and the alloy added would not make a metric coin.

Your committee made very extensive investigations, with the view of ascertaining whether a coin metal suited to the metric system, and maintaining the full standard value of United States coin, and adapted to all the various conditions and requirements of coinage, was possible. Coin metals, of course, are alloys, usually one-tenth of copper, but they are binary alloys. One metal of intrinsic value only, either gold or silver, and having only one element of intrinsic value, it is not adapted to realize one standard fixed by troy measure, and be made of metric weight. The interminable incompatibility has been already stated.

The first gold coins of the United States were ternary alloys of gold, silver, and copper, but the silver in them was not monetized, and so little copper was used that they were too soft, and the alloy too expensive; otherwise it possessed advantages of compressibility over the binary alloy of copper and gold now used.

A ternary alloy metal of gold and silver, as the two elements of intrinsic value, and copper as the metal to establish its adaptation to mintage requirements, was invented and patented by Dr. William Wheeler Hubbell, and presented by reference from the House to the attention of the committee, and by them to the Mint Bureau of the Treasury. This alloy coin metal has been developed into a metric dollar, the dies prepared, and the dollar coined at the Philadelphia Mint. It is the first metric dollar of full standard intrinsic value struck in the

world, and fulfills all the requirements for standard coinage of dollars, halves, quarters, and dimes, of metric measures, and in accord with United States coinage value.

After this discovery of the practical embodiments of the metric weight, without disturbing the value, and greatly increasing the superiority of this ternary alloy metal for coin, the solution of the proportions for metric gold coin was discovered, and resulted in the production of the metric double-eagle. The application of the same principles developed the fact that a metric silver dollar could be made of standard value, also presenting metallurgical superiority, as well as more convenient size than the 412.5 grain dollar.

Thus in these metallurgical results three great measures have been realized: first, the making, in the words of the Constitution of the United States, of "gold and silver coin," not as two distinct monometallic systems of coinage or money, but as one monometallic system of coinage of bi-metallic money, really gold and silver coin of full standard value, and of such denominations of value that all the advantages of both metals for money are obtained; second, the practical realization of the metric system in weights of coin, bearing simple relations to the gram, the unit of weight of the system, adapting the coin to universal use by the progressive foreign nations, and avoiding all loss in computations; third, the production of a coin metal of superior density, elasticity, sonority, endurance, and resultant intrinsic practical worth.

The introduction of the metric system in coinage has been delayed for the want of a scientific metallurgical solution of its application to standard values of coin, either gold or silver.

For over half a century this subject has baffled the skill of the most eminent investigators of the civilized world. The nearest approach was that proposed in this country a few years ago, to make the gold dollar to consist of 1.5 grams of pure gold, resulting in a loss of three dollars and a fraction in a thousand dollars, and the coin when alloyed to .9 fine would not itself be in any recognized metric measure of weight. It would be $1\frac{2}{3}$ grams, and there are no thirds in the metric system; a third is not expressible in decimals.

The French gold coins are not metric, not expressed in even numerals, and the denomination in cents not in even decimal units. The French five-franc silver coin is 25 grams in weight, .9 fine. This weight is metric, but the value is 93.5 cents, not a decimal unit of denomination; and the loss is still greater, being a loss of 6.5 per cent. short of our decimal unit of one dollar, or 100 cents.

These were the nearest approaches to the great desideratum.

It was a wise foresight in the founders of our system of coinage to place it upon the basis of decimal units of denomination, 10 cents, 25 cents, 50 cents, 100 cents, or one dollar, and even multiples of one dollar. All of our contracts, public and private, are founded on this decimal denomination of coinage, or of money.

The difficult problem has been to adapt these decimal denominations to the metric system, and still preserve their exact standard value. And it has been reserved for the honor of the United States not only to commence the decimal denominations, but to make this metallurgical discovery, and to solve this great complex problem, so important to the interests of the commercial world, and to present a system, decimal throughout, of exact standard values, fineness of the precious metals, embracing the use of both gold and silver on the highest plane or level of equality, on the standard practical ratio, and in even decimal denominations and multiples thereof, comprehending our entire coinage system,

and rendering it suitable for all nations with whom we may trade or hold interecourse.

The invention or discovery was first made by Dr. Hubbell, in the goloid dollar of 14.25 grams in weight, which was reported to the House of Representatives, Forty-fifth Congress, second session, July 8, 1878, by Mr. Vance, from the Committee on Coinage, Weights, and Measures, Report No. 918, with a joint resolution, No. 187, which unanimously passed the House, but was not reached in the Senate for final action. It required specimens to be furnished, and laid before the proposed International Congress, to fix a ratio between gold and silver.

The then Director of the Mint, Dr. H. R. Linderman, had specimen metric goloid dollars prepared and forwarded to our commissioners, as appears by his official letter of July 22, 1878, printed with a letter of July 24, 1878, from Dr. Hubbell, by order of the State Department, on request of the President of the United States.

Our established ratio of 16 to 1 in practical mintage is in accord with all of our obligations, and is claimed by expert practical men to be the best in all respects; and so thoroughly was the late Director of the Mint, Dr. Linderman, convinced of this, that instructions to this effect were sent to our then commissioners to Paris; and a late vote of the House of Representatives, by a very large majority, affirmed the propriety, substantially, of this monetary ratio.

The metric coinage system herein set forth is, at present, founded on this ratio of 16 to 1; but the principle upon which it is founded admits of any variation in weight, or in ratio, that may in future time be desired, if any, which is unlikely, as it embraces all the advantages of bi-metallic money, and more than all the benefits of mono-metallic coinages, without their disadvantages.

The next metric coinage discovered or invented by Dr. Hubbell was the "metric gold," comprising the gold double-eagle, 35 grams in weight and twenty dollars in value, and all the divisions of that denomination in United States coinage, consisting of the eagle, half-eagle, three dollars, quarter-eagle, and one dollar; this metric gold coinage, together with the goloid dollar, were reported favorably to the House of Representatives of the Forty-fifth Congress, third session, Report No. 64, on January 21, 1879, by the chairman of and from the Committee on Coinage, Weights, and Measures.

Subsequently, on January 24, 1879, the Secretary of State transmitted to the Secretary of the Treasury, dispatches of date January 3, 1879, from Hon. John A. Kasson, formerly chairman of the Committee on Coinage, Weights, and Measures, and at present minister at Vienna, in relation to a coin to express invoice values, in a unit of denomination near to the eight-florin piece, which latter coin had been allowed by the Treasury for this purpose, as a commercial convenience.

These papers were handed over by the committee to Dr. Hubbell, who worked out the problem perfectly in the metric gold coin of 400 cents even value, containing six grams of pure gold, three decigrams of pure silver, and seven decigrams of pure copper, seven grams even in total weight; closely approximating to all the foreign coin of near this denomination, and in all computations convertible into them, and into other United States coin with a single numeral, four, and absolutely metric in all respects, being one-fifth of the metric double-eagle.

A favorable report on the whole of this subject was made to the House of Representatives of the Forty-fifth Congress, third session, Report No. 136, on March 3, 1879, by the chairman of the Committee on Coinage, Weights, and Measures.

An equation of eight to one was then discovered by Dr. Hubbell between the goloid dollar and the metric gold coin, whereby the goloid dollar was made even 14 grams in weight, and the metric gold dollar 1.75 grams in weight, as originally discovered.

A metric silver dollar was then produced by him, precisely 25 grams in weight and 100 cents in value, thus overcoming the difficulty of denominational value, that existed in the French 5-franc silver-piece of this weight, and in our subsidiary silver coin of halves, quarters, and dimes, in metric weights copied from it.

This metric system of coinage is now perfected, by the inventor thereof, to include every denomination of the coins of gold and silver of the United States, .9 fine, and an international unit of denomination in the "stella," all in precise accord with every principle and condition required in United States coinage.

The specimens of the metric coin struck show superiority, the metal is tougher and more resistent to abrasion, and durable, on principles recognized in other alloys in metallurgy.

These metric coins are ternary alloys on the bi-metallic money basis; they embody a practical compensation of the precious metals in all respects, and no doubt, if adopted, will greatly facilitate the voluntary introduction and adoption in the United States of the metric system, which is already legalized by Congress, and which has been adopted by so many of the progressive nations of the earth. Its essential principle, a decimal system, is adapted to all commercial uses.

An important feature in these coins is that their weight is equally expressible in both the metric and in troy measures of weight. The two systems, metric and troy, come together on this perfected coinage basis.

In illustration of this, Exhibits B and C are hereto appended.

The bill H. R. 411 comprehends the coinage of the goloid metric dollar, two dollars, and fractions of a dollar, and also the coinage of the metric gold double-eagle, eagle, and half-eagle, all of standard value.

The following is their formulation as furnished by Dr. Hubbell, and tested and used by the Mint in making the coin.

1. METRIC GOLOID COIN; RATIO OF VALUE 1 TO 16.

Parts of alloy:

Pure gold, 76.5 centigrams; pure silver, 11.835 grams; copper, 1.4 grams; total 14 grams.

Expressed in standard metals:

Standard gold, .9 fine	.85 centigrams.
Standard silver, .9 fine	13.15 grams.
Weight, grams	14.00
Expressed in troy grains	216.05 + grains.

Minting proportions:

Pure gold	54.64	
Pure silver	845.36	= 1,000 parts.
Copper	100.00	

Value of the 85 centigrams of standard gold in the goloid dollar, in cents	50.841
Value of the 13.15 grams of standard silver in the goloid dollar, in cents	49.159
Cents	100.000

Multiples and divisions of the coin:

Two-dollar goloid coin	weight, 28 grams;	value,	$2 00
Half-dollar goloid coin	weight, 7 grams;	value,	50
Quarter-dollar goloid coin	weight, 3.5 grams;	value,	25
One dime goloid coin	weight, 1.4 grams;	value,	10

2. METRIC GOLD COIN; RATIO OF VALUE 1 TO 16.

Parts of alloy:

Pure gold, 30 grams; pure silver, 1.5 grams; copper, 3.5 grams; total, 35 grams.

Expressed in standard metals:

Standard gold, .9 fine	33.334 grams.
Standard silver, .9 fine	1.666 grams.
Weight, grams	35.000
Expressed in troy grains	= 540.125 + grains.

Minting proportions:

Pure gold	857.14	= 1,000 parts.
Pure silver	42.86	
Copper	100.00	
Value of the standard gold		$19.93.8
Value of the standard silver		6.2
Being one double-eagle, value		20.00

Divisions of the double-eagle in weight and value, expressed in denominations:

One eagle	weight, 17.5 grams;	value,	$10 00
Half-eagle	weight, 8.75 grams;	value,	5 00
Three-dollar coin	weight, 5.25 grams;	value,	3 00
Quarter-eagle	weight, 4.375 grams;	value,	2 50
One dollar	weight, 1.75 grams;	value,	1 00
One stella	weight, 7 grams;	value,	4 00

The metric goloid dollar is the real unit of value of "gold and silver," or of the precious metals, and of metric coinage; while the metric gold dollar of 1.75 grams would be the denominational unit of metric gold, and the metric silver dollar of 25 grams, hereafter specified, would be the denominational unit of metric silver.

The whole system of the precious metals consolidates itself on the goloid dollar as the real unit of value, possessing the compensating and controlling power of unity of use and valuation within itself, and drawing both the gold and the silver on the united standard, and ratio in practical mintage of 1 to 16, into itself, as their most valuable and useful embodiment; hence forcing and holding them to par, or 100 to 100. While as a metal it stands next to gold in density, and above either gold or silver in its sonority or ring, its colors differ from other alloys. Its toughness exceeds either gold or silver binary alloys. Its resistance to abrasion is in the aggregate fully equal to gold, and its convenience of size for its denominations of $2, $1, 50 and 25 cents, exceeds all other coin for American coinage. Its equation of value in weight to metric gold stands as 8 to 1.

The ratio of 16 to 1 is the true mintage relation of the metals, for the reason that it gives, in any conversion of values, terminable and precise quantities.

Very extensive computations on this subject of a ratio, for mintage and commercial use, were made in July last, under the auspices of the Mint Bureau of the Treasury Department, by competent experts, and they reached the conclusion that 16 to 1 was the most convenient and practical ratio between the metals, and this result was forwarded to our commissioners at Paris for the late monetary conference. That Congress refused to adopt any ratio, intimating that each state must take care of itself. In that examination of the subject of ratio the 15.5 which had been employed in Europe for their coinage was found to be inconvenient, for the reason that in computations it was discovered to result in interminable divisions, and remainders, of material importance.

A two dollar coin of goloid will also be serviceable for general use.

This metric dollar is capable of division into halves, quarters, and dimes of most convenient size and weight for the general purposes of coin in ordinary every-day purchases. It is near 216 troy grains, and 196.5 grains less than the silver dollar. The fractions would be proportionate in weight. The precious metals, as we mine them from the earth in very nearly equal portions, will be utilized and circulated together inseparably as money, alike for all in value, both the poor and the rich, and available for the use of all, owing to its divisibility into the smaller and most frequently used coins of a convenient size for constant change. The fact of this unit of coinage of the precious metals, and consequent circulation together as a unit, necessarily prevents one metal from expelling the other from either the country or from circulation. We mine them together. Nature shows us their affinity as one, and by this metallurgical discovery, formed into a ternary alloy, we are enabled to use them as metric coin, of full standard both in value and fineness, and in accord with all contracts, public and private. It is literally and in fact, in the words of the Constitution of the United States, "gold *and* silver coin." The framers of that instrument had an idea apparently of the equality of use of gold and silver. This coin metallurgically makes the equality of use a practical fact; and the profit is in uniting them, not in separating them.

The sonority or ring of this metric dollar exceeds that of either silver or gold. It works perfectly in mintage. The diffusion is perfect, and the fineness of the metal gives impression of extreme clearness and finish in its flow into dies.

The final color of the coin is a subject of somewhat skillful treatment, and may be varied by the chemistry employed. The coin have been produced, in blue compressed, and light gold raised figures; also, in the purple gold. These colors, unlike the single metal colors, cannot be imitated by electro precipitation. Both gold coin and silver coin in single colors can be imitated by the electro process. But this ternary alloy, in chemico-developed colors, is past the reach of any precipitation process. As a sequence or result, the density, sonorous ring, and color of this metric dollar are not by any known process capable of imitation or counterfeit in baser metals.

Our present gold coin and silver coin are extensively, and in some cases very adroitly, counterfeited, in both the ring and color, though not in weight.

The density of this goloid or metric dollar increases over the ingot density about five times as much as standard silver, under the same pressure, and it stands about .320 in density higher than silver coin. To this remarkable increase under pressure is perhaps due its high sonority above its elements, and its superior coinage finish.

The mines of the Pacific slope yield about 45 per cent. of gold to 55 per cent. of silver. The annual product of the entire mines of gold, gold and silver, and silver for 1878 is estimated at about $100,000,000. And this amount is about equal to our mint capacity to coin this metal into metric goloid dollars. It is smaller, requires less fusion, less power, and less weight than silver, and greatly exceeds it in coinage capacity. It avoids, in a great measure, the expense and labor of parting the metals as found in our mines. It is only necessary to refine them, assay them, and add the copper and other metals to make up the proportions, and in this respect is calculated to save a vast amount of expense and labor.

In England, Germany, and particularly in London, it would come within the class of bullion values known as doré silver, or silver with gold, which usually commands a premium or advance of about ¼*d.* per ounce above the sterling silver quotation. This is due to its availability

for use in the assay of low-grade silver with only a small portion of gold. But this country would probably need, and its growing population use, in its widespread territory and enterprises, and necessities for domestic comfort and internal prosperity, induced and stimulated by its presence, all that could be coined within the next ten years.

A table of the bullion intrinsic values of the gold dollar, the silver dollar, and this metric dollar, assuming gold to be the par metal at 100, is appended, on assumed fluctuations in silver at London, and showing the mint seigniorage for coinage, by purchase:

Silver, pence per ounce at London.	Gold at 100 par.	Silver dollar 412.5 grains.	Metric dollar and seigniorage.	
49	100	83.08	91.72	8.28
50	100	84.78	92.57	7.43
51	100	86.47	93.42	6.58
52	100	88.16	94.27	5.73
53	100	89.86	95.12	4.88
54	100	91.55	95.97	4 03
55	100	93.25	96.82	3.18
56	100	94.94	97.67	2.33
57	100	96.64	98.53	1.47
58	100	98.33	99.37	0.63
59	100	100.02	100.22	....
60	100	101.71	101.09	.....

Thus it will be seen from the above table that the metric dollar varies only 7.65 cents, while the London price of silver sterling varies from 49 pence to 58 per ounce inclusive, and the silver dollar varies 15.25 cents in the same bullion values, and that, in all this wide range of silver from 49 to 58 inclusive, the mint would have an average seigniorage on the purchase of the bullion of gold and silver of only 4.6 per cent. to cover the interest, waste, transportation, and all coinage expenses, including salaries of all officials and all employés; being barely sufficient to assure its self-support.

The tendency of this goloid metric coinage is to prevent this wide fluctuation in the metals. In unity of coinage and use there necessarily would result a unity of value. The prosperity developed by the constancy and abundance of this system would, as a result, induce the consumption of any surplus of silver in the fine arts and luxuries of life, in silver and manufactured ware. And the metric coin itself, owing to its value, would be exempt from destruction for this purpose, and be restricted to its legitimate and intended use, as current coin for commercial purposes.

The same principles will apply to its free coinage, on a seigniorage to be fixed by the Secretary of the Treasury. It is substantially a gold coinage, 1½ carats fine, monetizing silver, on a ratio of 16 to 1; and could stand upon the same footing as other gold coin, which is about 21 carats fine, as to the fact of free coinage; the seigniorage charge to be specific, and to cover all expense and cost in relation thereto.

The United States, by the adoption of this metric coinage, will then have a coinage production from its mines, exclusive of any importation, of about $100,000,000 annually, without conflict of the metals for supremacy, and freed from speculative influences, with which the poor and the rich alike can buy and sell in any amounts, and thus realize directly and fully the results of their industries, without the intervention of speculative prices or ruinous exchanges to make up for monetary differences. It will form a constant substantial currency, available for all of the people alike.

This bill (411) also provides for the coinage of metric gold coin of standard denominations, the double-eagle, eagle, and half-eagle.

The difficulties before stated, in relation to gold coin, have also been overcome, and a gold metric alloy, on the same principles, been invented by Dr. Hubbell, adapted to metric gold double-eagles, and eagles, and half-eagles, of precise metric measure of weight, and full and equal United States standard of fineness and of value.

The metric gold-double eagle, of $20 value, contains 30 grams of pure gold, 1.5 grams of pure silver, and 3.5 grams of pure copper, 35 grams in total weight, which is about 1.564 grams or 24 grains heavier than the present troy coin. Its color and durability are superior to the present coin, which having only copper in the gold, gives it a red or copper color and tarnish of the oxide of copper, and is too soft for wear. Ternary alloys have a recognized superiority in metallurgy, and this metric gold alloy develops the lighter gold or orange gold color, durability, value, sonority, and adaptation to United States standard metric gold coin, all in this one metal of ternary elements, in these proportions, and by which these results, which have been much desired in coinage, are fully attained. Intrinsically it contains $19.93.8 of pure gold and 6.2 + cents of pure silver; total, $20.00, and a plusage of one and a half cent in a thousand dollars for mint abrasion as it falls from the dies, and before delivery, being full, complete, and precise in standard value on delivery by the mint.

The important advantages of this metric gold coin are, that the gold is even 30 grams, the silver even 1.5 grams, the copper 3.5 grams. The gold is, therefore, standard .9 fine, and the silver is standard .9 fine in the coin, and the total weight is even 35 grams, and is precisely $20 in value. The superiority of the metal for constancy of value is strikingly shown by the fact that, although it measures the same in diameter, and on a plane, as the binary $20 coin, it, the metric, is 24 grains heavier, or 540.25 + grains in weight, showing, as well as in its rich orange gold color, its superiority for practical use, as it flows with a sharper and more distinct finish into the dies.

The bill H. R. 1911 provides for the coinage of the metric silver dollar and fractions thereof.

The formulation of this coin is as follows:

3. METRIC SILVER DOLLARS; RATIO OF VALUE 1 TO 16.

Parts of alloy:

Pure gold, 105 milligrams; pure silver, 22.395 grams; copper, 2.5 grams; total weight, 25 grams.

Expressed in standard metals:

Standard gold	.117 milligrams, .9 fine.
Standard silver	24.883 grams, .9 fine.
Weight, grams	25.000
Expressed in troy grains	=385.8 + grains.

Minting proportions:

Pure silver	895.8	1,000 parts.
Pure gold	4.2	
Copper	100.0	
Value of the 117 milligrams of standard gold		6.98 cents.
Value of the 24.883 grams of standard silver		93.02 cents.
Cents		100.00

Divisions of the coin:

One dollar (being the unit of denomination)	weight, 25 grams.	
Half-dollar	weight, 12.5 grams;	50 cents.
Quarter-dollar	weight, 6.25 grams;	25 cents.
One dime	weight, 2.5 grams;	10 cents.

This metric silver dollar is of the precise weight (25 grams) of the French silver 5-franc piece, the value of which is 93.5 cents.

This American metric silver dollar would be smaller, more dense, of the same weight, 100 cents in value, in even decimals as well as metric, and would therefore tend to displace the Belgian 5 franc, the Bolivian dollar, the French 5 franc, the Italian 5 lira, the Spanish 5 peseta, the Swiss 5 franc silver coin, in the markets of the world; it being 6.5 cents more valuable.

It is also much smaller than the present 412.5-grain dollar. And, on Change in London, at the present value of silver, would be worth 1.75 per cent. more, being .75 of one per cent. for the premium in silver on the gold, and 1 per cent. for its quality of doré silver, which is about equal to the expense of making such silver, or equal to the cost of its coinage; that is, the usual premium value of such class of metal is equal to the cost of its coinage, though this metric alloy metal of copper and doré silver for coinage is entirely new.

The bill H. R. 410 provides for a new metric gold coin, for international as well as domestic use, to be known as the "stella."

The committee, to whom was referred the communication of the Secretary of the Treasury, dated February 14, 1879, addressed to the chairman, transmitting a communication from the Secretary of State and a dispatch from the United States minister at Vienna, Mr. Kasson (Appendix Exhibit A), relative to the creation of a coin by the United States, of such intrinsic merit as to commend it by common consent for use, to express invoice values between this and other countries, gave the subject careful consideration, and reported favorably in relation to said coin (Forty-fifth Congress, third session, Report No. 136), and most of that may be properly stated here.

In the investigations heretofore made by the committee respecting the formulation of the metric system in coinage, without disturbing existing values of the precious metals of gold and silver, as expressed in this report, all the essential elements for a solution of the proposition for an international or invoice coin were involved, and it became only necessary to formulate and state them to suit the denomination of the coin best adapted to exhibit an international basis, or a domestic basis, of invoice values.

The committee fully concurs in the opinion of Minister Kasson as to the importance of such a coin if it can be devised. They also think that its denomination should be near to the eight florin, twenty franc, twenty lira, twenty Spanish pesetas, and eight Dutch florins, without, however, departing from the manifestly superior decimal divisibility and embodiment of the "Federal money," or coinage system of the United States.

These coins approximate most nearly to four dollars, or 400 cents. Their nominal value is 388.8 cents, as near as they can be estimated. A coin of that denomination precisely would not suit the people, nor the coinage system, of the United States. But 400 cents are a value readily convertible into every other, and capable of use in expressing every other sum, as it contains but a single numeral to be used in any calculation. The coin of 400 cents is precisely four dollars United States standard, and all multiples and divisions of it can be instantly determined. For example, 1,000 8-florin coin are equal to 3,888 dollars, which divided by 4 gives 972 as their equivalent in four-dollar coin.

The great difficulty heretofore has been to make such a coin and have it, in its parts and as a whole, bear simple relations of numerals to the

gram as the unit of weight for valuation, without any disturbance of values in the metal employed, nor in the denomination.

This committee for several years, and all Europe, as developed by the recent works ordered printed by the House, show the efforts made in this direction, and no opportunity was omitted in presenting the subject to numerous experts. The solution of the problem has been accomplished, as stated by the report by Dr. William Wheeler Hubbell, in the goloid dollar, and in the metric double gold eagle of twenty dollars, United States standard value. This furnishes the complete basis for the coin desired.

One-fifth part of the metal of this double-eagle gives the even numeral of 400 cents value, or four dollars; the simple relation of seven grams in weight and the single numerals of six grams of gold, three decigrams of silver and seven decigrams of copper, being expressed by single numerals throughout, precise in our standard value, and most complete and perfect, therefore, in every respect.

The official letters and correspondence of the chairman of the committee, upon the subject, with the Secretary of the Treasury, and test formulations, as prepared for the use of the committee by Dr. W. W. Hubbell, accompany this report, as Exhibits B and C.

Experience has shown, it is believed by the committee, that gold coin smaller than this denomination cannot be made with both sufficient celerity and uniformity, owing to the necessity of manipulation and dressing for accurate adjustment in weight. Smaller denominations of coin can be readily made of larger size of the goloid coin metal, fully explained in the report. Thus a two-dollar goloid coin would be the equivalent of half, and the goloid dollar one-fourth, of this coin of four dollars of metric gold, and they form practically an entire gold coinage, monetizing silver on the even ratio of 16 to 1, with an absolute use of both gold and silver on the same plane or level.

All coin should have specific names, and one suitable for this four-dollar coin, it is believed, would be "one stella," in analogy to one eagle, both the star and the eagle being national emblems on our coin.

The adoption of this four-dollar coin would make the two-dollar goloid coin more desirable than a five-dollar goloid coin, as it is both smaller and a numerical division of this standard of United States coin, for both general public and international or invoice use.

Such a coin must possess the intrinsic merit to "commend itself" to general use, by common consent or commercial convenience and acceptance. Conventions of States on such a subject cannot correct intrinsic defects. Metallurgical superiority will prove itself to be the superior law. This metric coin of gold of four dollars would possess every element of single numerals, even measure of value, tough and resistant durability, and metric throughout, in all its parts and as a whole, while the metal, as shown by the double-eagle coined, is superior in color, coining quality, and sonority or ring, which are certain evidences of superiority. And the committee therefore recommend its adoption, and also in this denomination, and of a distinct specific design, in the bill herewith submitted, to authorize the metric coinage. Specimens of this stella have also been made by the Philadelphia Mint.

One dollar in value of this metric gold weighs precisely one and three-quarters (1.75) grams; but public experience has shown that a one-dollar piece in gold, or even this weight, is too small for general use, as well as incapable of rapid and accurate adjustment of weight or value. The goloid dollar is neither too large nor too small, and is easily adjusted.

In the metric system the gram is the unit of weight, and all measures of weight are expressed in multiples of the gram and divisions of the gram. This is the first radical principle to be understood and recognized, in order to comprehend and use the system. The divisions are decigrams or tenths of a gram, centigrams or hundredths of a gram, and milligrams or thousandths of a gram. The multiples are on the same principle, a kilogram being a short name only for one thousand grams; but a kilogram is only a name, and is no unit, nor of any importance over 1,050 grams, 1,100 grams, or 1,250 grams. Hence, whatever weight is capable of expression in multiples and divisions of the gram by whatever name, or in numerical statement, is in accord with the metric system, and makes it so comprehensive as to be capable of universal application and use. Thus, metric gold eagles in large quantities, 35 grams in weight each, may be weighed by any multiple of 35; the stella, 7 grams in weight, by any multiple of 7; and the goloid coin, 14 grams to the dollar, by any multiple of 14.

The mint has made these coin of goloid and metric gold, the two principal coin, from the bills and metric formula furnished, found them correct, and stamped them with the formula, and the value in standard money—a mintage and metallurgical result never before accomplished, but here perfect in every respect. Hence, 100 metric double-eagles would contain 3 kilograms or 3,000 grams of pure gold, 150 grams of silver, and 350 grams of copper, and weigh 3.5 kilograms.

Two thousand goloid dollars would contain one kilogram five hundred and thirty (1.530) grams of gold; twenty-three kilograms six hundred and seventy (23.670) grams of silver; and two kilograms eight hundred (2.800) grams of copper, and weigh 28 kilograms.

These coins consist of certain proportions of metals, fused and mixed according to their degrees of affinity or natural cohesive qualities, of which certain metric weights make the value. Hence, in making up the portions, troy weights may be used. For example, 30 pounds of gold, 1.5 pounds of silver, 3.5 pounds of copper make the metric gold coin metal. Of this metal take 35 grams in weight, and it makes the exact value of a double-eagle, 2,000 cents or $20, as the coin falls finished from the coinage press, including abrasion, after adjustment, in passing through the dies, and seven grams of the alloy make one stella or four dollars.

The metric weights have been before established by law. (Section 3570, Revised Statutes.)

As to the inventor's rights to patents which have been granted to Dr. Hubbell, it is a right in pursuance of the inchoate right of invention and of the Constitution, and the section authorizing it is as fully an integral part of it as any other; it makes no exception in favor of the United States. If it did, inventive genius would have no inducement for the exercise of extraordinary industry and powers in this direction, and the government be left in the rear in the advance of civilization and science. Industry and genius need and must have a just reward or perish for subsistence. The object of the Constitution is to "promote the progress of the useful arts" by a right which will secure a just compensation, either directly in money, or through the exercise of the exclusive right. In this case the patents are for the alloy metals, and while the United States has the exclusive right to coin money, it has no right to use these superior metal alloys, patented, without compensation to the inventor for the use of his patents.

The wisdom and justice of the Constitution and the law in this respect are fully exemplified in the present subject. The Coinage Committee

has for years sought of scientists, both in and out of the public service, a solution of the problem without avail. The nearest approach was a loss of three dollars and a fraction in a thousand dollars, and the gross or alloy weight of the coin not metric, simply the weight of gold metric. Dr. Hubbell had been recognized by special acts of Congress, June 3, 1864, March 3, 1877, and the courts as a distinguished inventor. His goloid metal was referred by the House to the committee in 1877, and the committee asked his attention to a solution of the subject of metric coinage. He replied that he thought he could develop the metric principle without disturbing the value. And by 1879, by his own industry and expense, he produced the alloy and the coinage; showing the superior ductility, toughness, density, compressibility, resistance, sonority, accurate intrinsic value, and metric in all its elements and in whole as a coin. But for his right to patents and consequent lawful compensation this could not have been accomplished. One mill on the dollar only he has fixed as the royalty, to which he is justly entitled, to be paid by the bullion holder or the party for whom the coin is to be made.

The expense at present in parting the metals in the bullion is about $260,000 a year. Fully $200,000 of this will be saved, as they need not be parted for the goloid, and the free gold of our mines can be used for the metric gold. And the increased toughness and resistant durability of the metal alloy will save fully as much more in the abrasion of the coin, even if the government paid the royalty. Altogether the saving will six or seven times over exceed the royalty on the coinage, which is voluntary with holders of the bullion. When the goloid coin is preferred, the silver and gold circulate together as one metal of stable value. Practically all a gold coinage monetizing silver, or all a silver coinage monetizing gold. Neither metal can expel the other from active circulation, utility, and volume in their aggregate mass, which in their abundance in our mines will necessarily become an immense impetus to the industries and prosperity of the people of these United States. Their greatest value is when united; for if silver is rated above gold, then the union gives increase to the value of the gold. If gold is rated above silver, then the union gives increase to the value of the silver. If par for par, they stand firm, and no profit can be made in separating them. Their great strength and constancy in the monetary value and utility is in the union of the metals on this system of metric coinage.

The bill H. R. No. 412 provides for the mintage of ingots of metric gold alloy, and of metric goloid alloy, its deposit in the Treasury, and issue of certificates therefor.

The preparation of ingots for coinage can be conducted more rapidly than the coining of the pieces of money, and in order to enable the people to have the benefit of these ingots they are to be deposited in the Treasury as rapidly as prepared by the mint, and the Treasury to issue certificates therefor, which will serve all the purposes of money, and exchangeable for coin or ingots on demand. The mint to deposit coin and receive ingots as fast as needed for coinage.

The bill H. R. No. 1519 is to provide ingots of fine gold and of fine silver of uniform specific weights and value, both for manufactures and for settling differences of exchange or export; this saves our coin for domestic use, and also it provides manufacturers with a standard of uniform value and fineness, which answers the double purpose of readiness for settlement of exchanges and for general use, avoiding the destruction of our coin both at home and abroad.

The subject-matter of these bills has for many years been desired, investigated, and in hopeful expectation of being realized by the coinage

committees. We were the first nation to adopt a decimal system in denominations of coinage, and for this reason, we have been looked to by Europe as likely to perfect our decimal system by the discovery of metric coinage. American perseverance and genius have proved equal to the task.

Already this formulation of metric coinage and the report on metric weights and measures, 10,000 copies of which were printed by order of the first session of this Congress, have been largely in demand from every quarter, greatly exceeding the supply, showing a very great public interest in the metric system of weights and measures so largely adopted by European nations, and a desire to become familiar with this and all metric subjects. The United States Board of Trade, one of the most learned associations on the subject, also, at their recent session in Washington, considered, and by resolution appended, Exhibit D, approved and urged the adoption of this metric coinage of bi-metallic money by Congress. As to monetary conventions, it would be a dangerous experiment of entangling foreign alliance for us to make any convention with foreign nations on monetary ratios or monetary measures; it would sooner or later lead to embarrassing disagreements. The policy of this country has been to "avoid all entangling alliances with foreign nations." Our present practical ratio of 16 to 1 has proved the best in every respect; our obligations, public and private, are founded on it, and we see no reason to agitate or to disturb or in any way change it.

We, when taking our place amongst the nations of the earth as a free and independent people, originated the decimal system in coinage, and it has been reserved to our honor and advance in progressive civilization to perfect it full and complete in this metric system of coinage. It therefore remains for us only to adopt it in the exercise of that supreme sovereign power "to coin money and regulate the value thereof," vested in Congress by the Constitution of the United States.

Your committee severally report the bills H. R. Nos. 411, 1911, 410, 412, and 1519, without amendment, and favorably, and severally recommend their passage.

APPENDIX OF REPORT ON METRIC COINAGE.

EXHIBIT A.

DEPARTMENT OF STATE,
Washington, January 24, 1879.

SIR: Referring to former correspondence, I have the honor to inclose herewith a copy of a dispatch from the United State minister at Vienna regarding the adoption of the eight-florin gold piece as a standard of invoice values.

I have the honor to be, sir, your obedient servant,

WM. M. EVARTS.

The Hon. JOHN SHERMAN,
Secretary of the Treasury.

No. 145.] LEGATION OF THE UNITED STATES,
Vienna, January 3, 1879.

SIR: In acknowledging your dispatch No. 74, advising the adoption by the Treasury Department at Washington of the eight-florin gold piece of Austria as the standard of value for the certification of invoices by the United States consuls in this empire, I wish to express my conviction of the wisdom of the rule thus established by the Secretary of the Treasury.

The daily quotations in the journals of the fluctuating values of silver and paper, shown especially in the irregular price of exchange on London, indicate the inequality to which importers of the same goods, purchased at different times, would be subjected by a fluctuating invoice value and the embarrassments it might create at the custom-house.

Besides this practical inconvenience and possible injustice, which will now be avoided, there is the advantage of equality in value between the 8-florin and the 20-franc and the 20-lira gold pieces; also equal to 20 Spanish pesetas, and 8 Dutch florins; and so would facilitate the judgment of the appraisers at the various ports of the United States where ascertaining the correctness of invoice values, not only when the articles are imported from the same country, but when they are imported from competing countries.

This advantage will be appreciated if you imagine the existence of a single international coin, universally adopted, in which all values should be expressed for international use.

I hope the day is not distant when such a coin will be adopted by common consent of civilized nations, as recommended by the Committee on Coinage, Weights, and Measures of the House of Representatives in their report of 1866.

In this connection I venture to ask the attention of the Treasury Department and of the government to the propriety of seeking such a standard or of adopting an existing one in which all invoice values should be expressed in a single denomination and its decimals.

The most convenient because the most universal existing coin would, perhaps, be one of the same value with the standard above mentioned. The United States have no coin closely approximating the value of the 20-franc piece. If a new gold coin were authorized by Congress, to be of the exact value of the gold piece already better known throughout Europe and the East than any other single coin, and this to be issued in substitution for the three-dollar gold pieces, which should be withdrawn, we should have a standard of money in which not only all custom-house accounts might be accurately kept, but which might gradually become the standard of all international commercial transactions, and even for the settlement of values of our home commerce in articles which are largely exported.

One important effect would be to constantly enlighten our producers of grain, tobacco, cotton, petroleum, &c., upon the fluctuations of the foreign market, which are now so much obscured by unknown values of foreign denominations.

Knowing the enlightened interest of the Secretary of the Treasury in this question of a common international standard, I take the liberty to submit these views to the government

I have the honor to be, sir, your most obedient servant,

JOHN A. KASSON.

The Hon. WILLIAM M. EVARTS,
Secretary of State, Washington.

TREASURY DEPARTMENT,
February 14, 1879.

SIR: I have the honor to inclose herewith, for your information, copy of letter dated the 24th ultimo, from the Secretary of State, inclosing copy of dispatch dated the 3d ultimo, from Hon. John A. Kasson, United States minister at Vienna, containing his views relative to a uniform coinage by the principal nations of the world.

Very respectfully,

JOHN B. HAWLEY,
Acting Secretary.

Hon. ALEXANDER H. STEPHENS,
Chairman Committee on Coinage, Weights, and Measures,
House of Representatives.

HOUSE OF REPRESENTATIVES,
COMMITTEE ON COINAGE, WEIGHTS, AND MEASURES,
Washington, D. C., February 19, 1879.

DEAR SIR: Your letter of 14th instant (per Assistant Secretary), inclosing letter of the honorable Secretary of State and of our minister at Vienna, was received and considered.

The general subject has been long a study in the committee, and was involved in the consideration of the metric system, and the recent formulations of metric coinage, both in the double-eagle and the goloid dollar. The particular suggestion of the letters now received as to an approximate denomination of coin for invoice or international use, consistent with our general system of even hundred and decimal divisions, is of much importance. The foreign coin referred to are about $3.88 in estimated value, and the nearest approximation to it consistently with our system, and far more advantageous, would be a coin of 400 cents, or four dollars' value, being precisely one-fifth of the metric double-eagle recently struck. "Four hundred cents," having only one numeral, is instantly convertible into any other sum or denomination, that is, by the use of the figure 4. The same advantage is also presented in the metric formulation of the coin, which is all in single numerals, that is, 6 grams of gold, 3 decigrams of silver, and 7 decigrams of copper, 7 grams in weight; possessing all the advantages of simple relations to the gram, of full standard value, and interconvertible with all values by the use of a single number (4).

Will you please have a specimen or specimens, say five, of this coin struck? The obverse design similar to that of the double-eagle = 6 g. .3 S. .7 C., 7 grams—1879.

The reverse—"United States of America, Four Dollars, E pluribus unum, Deo est gloria," and a large star emblazoned, in it the words, "One stella, 400 cents."

At my request, Dr. W. W. Hubbell formulated this coin to suit the metric system of the double-eagles.

All over the world this will show the intrinsic measure and value of the coin, and exhibit its remarkable adaptation to use as an international coin.

Very respectfully,

ALEXANDER H. STEPHENS,
Chairman Committee Coinage, Weights, and Measures.

Hon. JOHN SHERMAN,
Secretary of the Treasury

EXHIBIT B.

WASHINGTON, D. C., *May* 5, 1879.

DEAR SIR: At your suggestion, I embody and append hereto an entire formulation of the perfected system of metric alloy and coinage of gold and silver invented by myself, and respectfully submit the same for your consideration, that of the committee of which you are chairman, and of the Congress of the United States.

This entire system of metric coinage, and its auxilliary monetary representation, or equivalents, of coinage ingots and certificates, are embraced in practical form in the House bills numbers 410, 411, 412, 1911, and fine ingots for export and manufacturing use in No. 1519.

In my judgment this precious metal monetary system is now perfect in every respect, and is the full and complete realization of the metric measure of weight in standard coinage; a discovery for which the world has been looking to us, for the reason that ours was a decimal system of denominations, and the decimal is the essential

principle of the metric system, with the meter as its unit of measure, and the gram as its unit of weight, derived from the meter. I petition for its adoption.

Respectfully,

WM. WHEELER HUBBELL.

Hon. ALEXANDER H. STEPHENS,
Chairman of the Committee on Coinage, Weights, and Measures of the House of Representatives of the Forty-sixth Congress.

Formulations of the metric system of coinage of gold and silver of United States denominations, standard value and fineness.

1. METRIC GOLD COIN; RATIO OF VALUE 1 TO 16.

Parts of alloy:

Pure gold, 30 grams; pure silver, 1.5 grams; copper, 3.5 grams: total 35 grams.

Expressed in standard metals:

Standard gold, .9 fine	33.334 grams.
Standard silver, .9 fine	1.666 grams.
Weight, grams	35.000
Expressed in troy grains	=540.125 grains.

Minting proportions:

Pure gold	857.14	=1,000 parts.
Pure silver	42.86	
Copper	100.00	

Value of the standard gold	$19.93.8
Value of the standard silver	6.2
Being one double-eagle, value	20.00

Divisions of the double-eagle in weight and value, expressed in denominations:

One eagle	weight,	17.5 grams;	value,	$10 00
Half-eagle	weight,	8.75 grams;	value,	5 00
Three-dollar coin	weight,	5.25 grams;	value,	3 00
Quarter-eagle	weight,	4.375 grams;	value,	2 50
One dollar	weight,	1.75 grams;	value,	1 00
One stella	weight,	7 grams;	value,	4 00

I do not advise metric gold coin of less value than $4. The denomination of "one stella" is the proposed new unit of denomination for invoice valuations, into which, it being even 400 cents in value, the units of value of all nations, and their approximate coin, in hundreds or thousands, are readily convertible, and to which they may be easily made precisely conformable, and thus adopt our decimal system for all invoice values. Gold coins less than $4 are too small for convenient use, too expensive and difficult to adjust in mintage, and wear away too rapidly.

2. METRIC GOLOID COIN; RATIO OF VALUE 1 TO 16.

Parts of alloy:

Pure gold, 76.5 centigrams; pure silver, 11.835 grams; copper, 1.4 grams: total, 14 grams.

Expressed in standard metals:

Standard gold, .9 fine	.85 centigrams.
Standard silver, .9 fine	13.15 grams.
Weight, grams	14.00
Expressed in troy grains	216.05 grains.

Minting proportions:

Pure gold	54.64	=1,000 parts.
Pure silver	845.36	
Copper	100.00	

Value of the 85 centigrams of standard gold in the goloid dollar, in cents	50.841
Value of the 13.15 grams of standard silver in the goloid dollar, in cents	49.159
Cents	100.000

Multiples and divisions of the coin:

Two-dollar goloid coin	weight, 28 grams;	value,	$2 00
Half-dollar goloid coin	weight, 7 grams;	value,	50
Quarter-dollar goloid coin	weight, 3.5 grams;	value,	25
One dime goloid coin	weight, 1.4 grams;	value,	10

The metric goloid dollar is the real unit of value of "gold and silver," or of the precious metals, and of metric coinage; while the metric gold dollar of 1.75 grams would be the denominational unit of metric gold, and the metric silver dollar of 25 grams, hereafter specified, would be the denominational unit of metric silver.

The whole system of the precious metals consolidates itself on the goloid dollar as he real unit of value, possessing the compensating and controlling power of unity of use and valuation within itself, and drawing both the gold and the silver on the united standard, and ratio in practical mintage of 1 to 16, into itself, as their most valuable and useful embodiment; hence forcing and holding them to par, or 100 to 100. While as a metal it stands next to gold in density, and above either gold or silver in its sonority or ring, its colors differ from other alloys. Its toughness exceeds either gold or silver binary alloys. Its resistance to abrasion is in the aggregate fully equal to gold, and its convenience of size for its denominations of $2, $1, 50 and 25 cents, exceeds all other coin for American coinage. Its equation of value in weight to metric gold stands as 8 is to 1.

3. Metric silver dollars; ratio of value 1 to 16.

Parts of alloy:

Pure gold, 105 milligrams; pure silver, 22.395 grams; copper, 2.5 grams: total weight 25 grams.

Expressed in standard metals.

Standard gold	.117 milligrams, .9 fine.
Standard silver	24.883 grams, .9 fine.
Weight, grams	25.000
Expressed in troy grains	=385.8 grains.

Minting proportions:

Pure silver	895.8	1,000 parts.
Pure gold	4.2	
Copper	100.0	

Value of the 117 milligrams of standard gold	6.98 cents.
Value of the 24.883 grams of standard silver	93.02 cents.
Cents	100.00

Divisions of the coin:

One dollar (being the unit of denomination)	weight, 25 grams.	
Half-dollar	weight, 12.5 grams;	50 cents.
Quarter-dollar	weight, 6.25 grams;	50 cents.
One dime	weight, 2.5 grams;	10 cents.

This metric silver dollar is of the precise weight (25 grams) of the French silver 5-franc piece, the value of which is 93.5 cents.

This American metric silver dollar would be smaller, more dense, of the same weight, 100 cents in value, in even decimals as well as metric, and would therefore tend to displace the Belgian 5 franc, the Bolivian dollar, the French 5 franc, the Italian 5 lira, the Spanish 5 peseta, the Swiss 5-franc silver coin, in the markets of the world, it being 6.5 cents more valuable. The "one-stella" gold coin would also circulate all over the world, because of its convenient denomination and metric measures, bearing simple relations to the gram. Exchanges would be settled in the fine bullion $100 ingots, gold with gold countries and silver with silver countries, until circumstances force them to adopt in full this metric system, as they will; or the rapid growth of this country will draw both the gold and silver from them to go into our metric coinage, where it will be most valuable, and our industries become so vast in surplus productions, that not only will there be employment for all, in the creation of permanent wealth and improvements in this country, but the exchanges of the world will be in our favor; and the monometallic gold countries of Europe will have missed the possibility of making this country subordinate to their concentration of money power on gold alone, while America will have her metric gold and goloid coinage and ingots, backed by the richest gold and silver mines of the world, as her sure foundation of reliance for the stability of value of the works or productions of her industry. The weights of these coin

are expressed in both metric and in troy measures. This is an important feature in the formulation and discovery, that both the metric and troy systems come together, on this coinage basis, perfectly.

Prepared for the Committee on Coinage, Weights, and Measures, first session Forty sixth Congress, by

WM. WHEELER HUBBELL,
Counsellor, Expert, Inventor & Patentee.

WASHINGTON, D. C., *May* 5, 1879.

EXHIBIT C.

Table of the *metric coin* stated both in troy grains and form and in the French metric gram and form of weights.

Metric gold coin.

Troy grains.		Grams.		Dollars.		Kind of coin.
$540\frac{1}{8}$	=	35	=	20.00	=	one double-eagle.
$270\frac{1}{16}$	=	17.5	=	10.00	=	one eagle.
$135\frac{1}{32}$	=	8.75	=	5.00	=	half-eagle.
$108\frac{1}{40}$	=	7	=	4.00	=	one stella.
$67\frac{33}{64}$	=	4.375	=	2.50	=	quarter-eagle.
$27\frac{1}{160}$	=	1.75	=	1.00	=	one gold dollar.

Metric goloid coin.

$432\frac{1}{10}$	=	28	=	2.00	=	two dollars goloid.
$216\frac{1}{20}$	=	14	=	1.00	=	one goloid dollar.
$108\frac{1}{40}$	=	7	=	0.50	=	half goloid dollar.
$54\frac{1}{80}$	=	3.5	=	0.25	=	quarter goloid dollar.
$21\frac{605}{1000}$	=	1.4	=	0.10	=	goloid dime.

Metric silver coin.

$385\frac{8}{10}$	=	25	=	1.00	=	one silver dollar.
$192\frac{9}{10}$	=	12.5	=	0.50	=	half silver dollar.
$96\frac{45}{100}$	=	6.25	=	0.25	=	quarter silver dollar.
$38\frac{58}{100}$	=	2.5	=	0.10	=	one silver dime.

WM. WHEELER HUBBELL,
Counsellor and Inventor.

EXHIBIT D.

During the meeting of the United States Board of Trade, held at Washington, December 10 and 11, the subjoined important resolution in relation to metric coinage was passed by that body:

"*Resolved*, That the metric system of the coinage of gold and silver as bi-metallic money, reported in the Forty-sixth Congress, extra session, by the Hon. Alexander H. Stephens, chairman of the Committee on Coinage, Weights, and Measures, having been thoroughly considered, this board respectfully urges its favorable consideration and adoption by Congress, on the grounds that it embodies the full intrinsic standard of value, the even decimal denominations of United States coinage and the metric system in a bi-metallic coinage of gold and silver, in the most useful forms, denominations and divisions for commercial purposes."

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